

ALTER H. FLOOD & CO., INC.

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Soil Investigation No. 7405-0138
Proposed Solid Waste Disposal Facility
Central Avenue near Sauk Trail
Cook County, Illinois

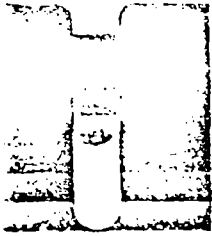
US EPA RECORDS CENTER REGION 5



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Prepared for

9/25/74
John Sexton Sand and Gravel Company
900 Jorie Boulevard
Oakbrook, Illinois 60521



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& Co., Inc.**

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September 25, 1974

John Sexton Sand and Gravel Company
900 Jorie Boulevard
Oakbrook, Illinois 60521

Re: Soil Investigation No. 7405-0138
Proposed Solid Waste Disposal Facility
Central Avenue near Sauk Trail
Cook County, Illinois

Attn: Mr. Arthur Daniels

Gentlemen:

Enclosed is our final report of the subsoil investigation for the reference project.

If you have any questions concerning this report, or should we be able to assist you in any way, please call upon us.

The soil samples are being retained in our laboratory for 30 days for your possible future reference.

Respectfully submitted,

WALTER H. FLOOD & COMPANY, INC.

Raymond J. Flood, P.E.

Registered Professional Engineer
Illinois 21775

RJF:jk

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ON AND TESTING OF MATERIALS AND STRUCTURES • SPECIFICATIONS & REPORTS • PHYSICAL & CHEMICAL TESTS • RESEARCH & CON-
ON • CONCRETE CORE CUTTING • FOUNDATION INVESTIGATION • FACILITIES INSPECTED BY CEMENT & CONCRETE REFERENCE LABORATORY

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WALTER H. FLOOD & CO., INC.

Soil Investigation No. 7405-0138

I. Scope

This report has been prepared in accordance with generally accepted soil and foundation engineering practices, and represents the results of the subsoil investigation for the proposed solid waste disposal facility located west of Central Avenue, and north of Sauk Trail, Cook County, Illinois.

The purpose of the investigation is to secure and log subsoil information, to record the geological nature, type, consistency and thicknesses of the various soil strata as encountered in the borings, to perform laboratory tests, and to evaluate all of the data obtained in order to make conclusions and recommendations to assist in the design and construction of the specific project at the location discussed herein. In the event that any changes in the design of the project, however slight, are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and the conclusions and recommendations of this report modified or reaffirmed in writing. In the event that conclusions and recommendations based upon the data of this report are made by others, such conclusions and recommendations are not our responsibility unless a review is made and a concurring opinion submitted in writing.

II. Project Location

The project site is located in Cook County, Illinois. It is about 30 acres in area bounded by Central Avenue on the West, the Commonwealth Edison Company Right-of-Way on the north and Interstate Highway 57 on the east. It is located in Section 28 Township 35 North Range 13 East of the Third Principal Meridian.

II. Project Topography

The project site is a former borrow area, where soils were excavated for use as fill on the nearby Interstate Highway 57. The excavation presently contains water. However

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II. Project Topography (Continued)

from the furnished topography the maximum depth of excavation is about 15 feet. Formerly the project topography was gently sloping northward with a total relief of about 10 feet. A depressional area existed in the northeast portion of the site. Surface drainage was northward to Butterfield Creek for the east part of the site, and westerly to Hickory Creek for the west part of the site.

V. Project Geology

The project site is located on the ground moraine of the Valparaiso Moraine System. The tills of the Valparaiso moraine are clays, and they were found to range from 45 to 55 feet thick in the borings taken at the project site. The tills are complex deposits and though predominantly clays are occasionally interbedded with thin layers of sand or silt. The tills of the Valparaiso glacier underlain by older glacial deposits predominantly glacio-fluvial sands, with bedrock, the Silurian Dolomite at an average depth of about 90 feet below ground surface.

. Project Soil Conditions

Reference is made to the two soil profiles enclosed with this report. The test borings reveal the Valparaiso tills to depths of about 45 to 60 feet at the test boring locations. These clay tills consist of clays, silty clays, and sandy clay, with an occasional sand layer or lens. These clays range from a hard consistency due to desiccation in an upper "crust" about 15 feet thick. This clay "crust" is expected to be missing in the borrow area. These clays in the "crust" are brittle in their natural state. Below about 15 feet the clays become plastic, and silty and sandy clay strata are intermittently encountered. The Valparaiso tills are classed as highly impermeable soils, and are expected to provide a natural barrier to flow of possible leachates from the solid waste fill, as well as provide a good

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V. Project Soil Conditions (Continued)

Below the impervious Valparaiso tills are generally found previous water bearing sand. At the two borings extending into bedrock these sands appear interbedded with clay and silt, and range from about 15 feet to about 30 feet thick. These sands are generally non-plastic, of medium to high relative density. These sands are considered aquifers.

Immediately above the bedrock, impervious silt-gravel drifts were encountered. These drifts appear to be Lemont drift, moderately to highly impermeable. Gravel and boulders are encountered in this drift.

Bedrock, the Niagran dolomite of Silurian age was cored at locations of borings 1 and 6. It is light gray in color, with bedding layers of 2 to 12 inches, and is jointed. It is a hard dense rock, and an aquifer, the source of potable water for lower yield residential wells in the vicinity.

VI. Project Hydrology

Surface water presently is contained within the site in the excavation. Prior surface water runoff of the site was both northerly to Butterfield Creek and westerly to Hickory Creek, and it is assumed that final topography after filling will be near the original. A shallow ground water was encountered at about the elevations of the surface of the existing water in the excavation, up to 6 feet below grade. This water is contained in local lenses and seams of silt or sand in the clays. The direction of flow of this shallow ground water is presently toward the pond in the borrow pit but upon completion of the fill is expected to be generally similar to the original topography, to the north and to the west.

The bedrock underlying the site of the Silurian Niagran Dolomite is an aquifer, the source of potable water for low yield residential wells. It was found to have

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Project Hydrology (Continued)

a potentiometric level about 30 feet above the rock. The general direction of flow is expected to be south easterly.

Feasibility of Site for Development of Solid Waste Disposal Facility

The depth of the present borrow pit on the site was shown on the furnished topographical survey. Depth ranges from a few inches to about 7 feet below water surface of 722.8. The quantities of available cover should be stated, and if the site does not contain sufficient cover, more expensive off site cover soils may be required. The soils removed in trench excavation will provide suitable cover soils.

Sufficient highly impervious clay tills will have to be left in place below trench or area excavations to preclude downward movement of leachate from the fills. It is recommended that a minimum of 5 feet of the highly impervious clays be left in place. Depth of excavations below present grades at the surface are then expected to be limited to 40 to 55 feet, or to elevations averaging about 680. Local sand layers were encountered in the tills and these sand layers appear to be water bearing. Some pumping from trenches or excavations is expected to be necessary but no appreciable thickness of sand was encountered indicating that no large quantities of ground water are likely to be encountered. Further, to prevent lateral movement of leachates into these sand layers it will be necessary to seal them with impervious materials. Clays removed from the excavation will provide excellent impervious sealing materials, and should be placed a minimum of 2 feet thick over all sand seams encountered. Other types of seals such as bentonite, or bituminous membranes may also be utilized.

Depending upon the height the fill is to be placed, it is assumed that the upper final ground water flow will be bi-directional, or as the topography existed prior to the borrow excavation. Final cover soils should be impervious clays to preclude percolation

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Feasibility of Site for Development of Solid Waste Disposal Facility

Placement of observation wells is recommended to be at the northwest corner of the site and at the southwest, the expected directions of ground water flow. These wells should be placed in the sand underlying the clay tills.

Bibliography

1. Geology of the Chicago Region Parts I and II, Illinois State Geological Survey, Bulletin No. 65, 1939, 1955.
2. Pleistocene Stratigraphy of Illinois, Illinois State Geological Survey, Bulletin No. 94, 1970.
3. U.S. Geological Survey Topographical Map Steger Quadrangle, 1953.
4. Plat Book Southern Cook County, Rockford Map Publishers, 1970.
5. Well logs furnished by the Illinois State Geological Survey, Urbana, Illinois.

Conditions of the InvestigationA. Ground Water

Our interpretations of the ground water levels on the site have been made based upon the water level readings stated on the soil boring logs and a study of available data noted in the bibliography. However, it must be noted that fluctuations in the level of the ground water may occur due to variations in rainfall, temperature, soil permeability, and other factors not evident at the time of the water level measurements. The probability of ground water level variation is anticipated. The design drawings and specifications should accomodate such possibilities of ground water fluctuation, and construction planning should be based upon such assumptions and variations of the ground water.

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Conditions of the Investigation (Continued)B. Proposed Development

From data furnished to us, it is understood that the improvement is to be a trench or area method solid waste disposal facility.

C. Changed Soil Conditions

The analysis and recommendations made in this report are based upon the data obtained from the six (6) borings performed at the locations as selected by your representative to obtain representation of the possible soil conditions on site. This report does not reflect any soil variations which may occur between the borings. Since the nature and extent of soil variations between the borings may not become evident until construction, it may be necessary to re-evaluate the recommendations of this report after performing on-site observations during the excavation period of construction. It is recommended that we be retained to perform continuous review of the soils conditions during the excavation period of the project.

D. Soil Boring Logs

The soil boring logs have been prepared from the field and laboratory data, supplemented by examination of the soil samples by the project engineer. The soils descriptions have been made by visual classification by qualified soils personnel. The driller has interpreted soil conditions between the samples. Consistency classifications are based upon the laboratory test or field penetration test data. The stratification lines may represent approximate boundaries between soil types as the change may be transitional. For instance, coloring changes in the upper soils are often due to weathering, and are usually transitional rather than abrupt. Natural topsoil stratification is almost always transitional. Soil stratification by consistency may be abrupt in the case of stratification of soils of differing origin,

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A. Conditions of the Investigation (Continued)E. Laboratory Soil Tests

Laboratory tests performed on samples of the soils consisted of calibrated penetrometer tests, unconfined compressive strength (ASTM D2166) and natural water content (ASTM D2216). The results of these tests are entered on the soil boring logs. Grain size analyses, cation exchange capacity, and permeability tests were also conducted on representative samples of cohesive soils and the results of these tests are included on the soil gradation analysis test sheets.

F. Field Investigation

The field investigation was started on May 15, 1974 and completed on June 14, 1974 (wet site conditions delayed completion). The test borings were made with a hollow stem auger type of drill rig (tractor and truck mounted) utilizing split tube (ASTM D1586) type of sampling at five-foot maximum intervals. Six (6) test borings were made. The soil types, nature, consistency, strata depths and thicknesses, and the sampling data were recorded on the field logs. In the split tube sampling, the standard penetration "N" (the number of blows of a 140-pound hammer dropping 30 inches to drive the standard 2-inch O.D. split tube) was recorded in 6-inch increments and entered on the field logs. Representative samples from the split tube were placed in jars, sealed, and delivered to the laboratory for further classification and testing.

In the non-cohesive soils the hollow stem of the auger served as casing to prevent caving of the soils. In the rock coring (ASTM D2113) a double tube core barrel of AX size was used with a diamond bit. Cores were extracted from the core barrel, placed in boxes in sequence of removal, labeled, and sent to the laboratory for further classification and testing.

During drilling, immediately after completion of drilling, and at least 24 hours

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Conditions of the Investigation (Continued)

F. Field Investigation (Continued)

holes and the readings recorded on the boring logs.

Relative ground surface elevations of the bore holes were estimated from the furnished topographical survey. Test borings were located to have an accuracy of plus or minus 5 feet from the dimensioned location.

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General ConditionsA. Report Preparation and Review

This report has been prepared in accordance with the generally accepted Soil and Foundation Engineering practices. No other warranty, expressed or implied, is intended. The report has been prepared for the client for his stated purposes only, and the report may not contain sufficient recommendations nor information for other parties or uses. In the event that any changes in the design of the project, however slight, are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed, and the conclusions and recommendations of this report modified or reaffirmed in writing. In the event that conclusions and recommendations based upon the data of this report are made by others, such conclusions and recommendations are not our responsibility unless a review is made and a concurring opinion is submitted in writing.

B. Test Boring Locations

The test borings have been located by the method stated in this report. The test borings were located to be within 10 feet from the location shown on the diagram enclosed with this report. Elevations of the ground surface at the boring locations are to an accuracy of plus or minus 0.5 feet.

C. Test Boring Logs

Field boring logs were prepared in the field by a qualified driller foreman. These field logs, on file in our office, give pertinent field data including boring number, date(s) of taking the boring, methods of drilling and sampling, depths of samples, descriptions of the various soils sampled, observed, and estimated between samples, ground water readings, and other observed conditions considered pertinent to the investigation. The soils between samples may have been determined by the drilling foreman based upon "feel" of the drill bit, or wash cuttings. The changes in soil strata may be transitional rather than abrupt, particularly with respect to coloring, weathering, and consistency changes. The amount of large sized gravel or boulders is generally estimated because sampling tubes seldom retain these larger sized soil particles. The field soils descriptions have been reviewed, and reaffirmed or modified by visual examination of soil samples by qualified soils personnel in accordance with the enclosed boring log explanation sheet. Soil consistency classifications are based upon the laboratory tests or field penetration tests. The final test boring logs have been prepared from the field data, the sample review, and the

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General Conditions (Continued)D. Ground Water

Our interpretations of the ground water levels on the site have been made based upon the water level readings stated on the soil boring logs. However, it must be noted that fluctuations in the level and quantity of the ground water may occur due to variations in rainfall, temperature, soil permeability, and other factors not evident at the time of the water level measurements. The probability of ground water level variation is anticipated, and the design drawings and specifications should accommodate such possibilities, and construction planning should be based upon such assumptions and variations of the ground water.

E. Changed Soil Conditions

The analysis and recommendations made in this report are based upon the data obtained from the borings performed at the locations as indicated on our enclosed drawing. This report does not reflect any soil variations which may occur between the borings. Since the nature and extent of soil variations between the borings may not become evident until construction, it may be necessary to re-evaluate the recommendations of this report after performing on-site observations during the excavation period of construction. It is recommended that we be retained to perform continuous construction review during the excavation, backfill, and foundation phases of the project. We can assume no responsibility for the construction compliance with the recommendations unless we have been retained to perform this on-site review during construction.

F. Allowable Soil Bearing

The allowable soil bearing values recommended in this report include a minimum factor of safety as noted with respect to the minimum soil strength, with the estimated settlement noted. The allowable soil bearing is in excess of the existing overburden stress at the recommended depth.

G. Construction Inspection

The soil test borings performed for this investigation do not necessarily give a complete picture of all of the soils that may be encountered in excavating for the project. Soil variations are apt to be experienced. It is, therefore, recommended that qualified soils personnel be engaged to inspect all subsoils exposed during stripping, site grading, and excavation operations. These inspections should occur

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General Conditions (Continued)G. Construction Inspection

soils encountered during construction and during field boring operations. Specifically, the construction inspection of subsoils should include determination of "topsoil" stripping depth, verification of foundation bearing soils, tests of cohesive soils to verify soil bearing capacities, approval of fills, and density tests of fills to insure that fills are placed to specification requirements.

If piles not easily spliced are selected for the foundations, test piles should be driven at representative locations on the project site to determine possible pile length variations. Pile capacities of all driven piles should be determined during pile driving operations utilizing an approved dynamic pile formula. Pile load tests are recommended to substantiate the pile design loadings.

If caisson foundations are included in the recommendations of this report, construction inspection is recommended to verify design dimensions, plumbness, bottom cleanliness, and bearing capacities of the foundation soils.

H. Settlement

Initial foundation settlement is due to the immediate elastic deformation of the soils as the soils are stressed. This deformation leads to a certain amount of initial foundation settlement, which is considered normal. For the recommended bearing values at the stated depths, this initial settlement has been computed or estimated and the magnitude detailed in the Foundation Recommendation section of this report.

"Shrinkage" settlement is caused by the shrinkage of foundations soils because of drying. Clay and silt soils characteristically shrink until their moisture content is reduced to a limiting value called the shrinkage limit. Although the drying of soils is not common in the area, the stated soils are susceptible to shrinkage. Prolonged droughts, withdrawal of soil moisture by trees and shrubs, and evaporation can cause "shrinkage" settlement of structures founded on or above these soils. The general area practice is to assume this risk of possible "shrinkage" settlement of the shallower foundations rather than to utilize more costly, deeper foundations.

Consolidation, or long-term, settlement is due to the gradual expulsion of pore

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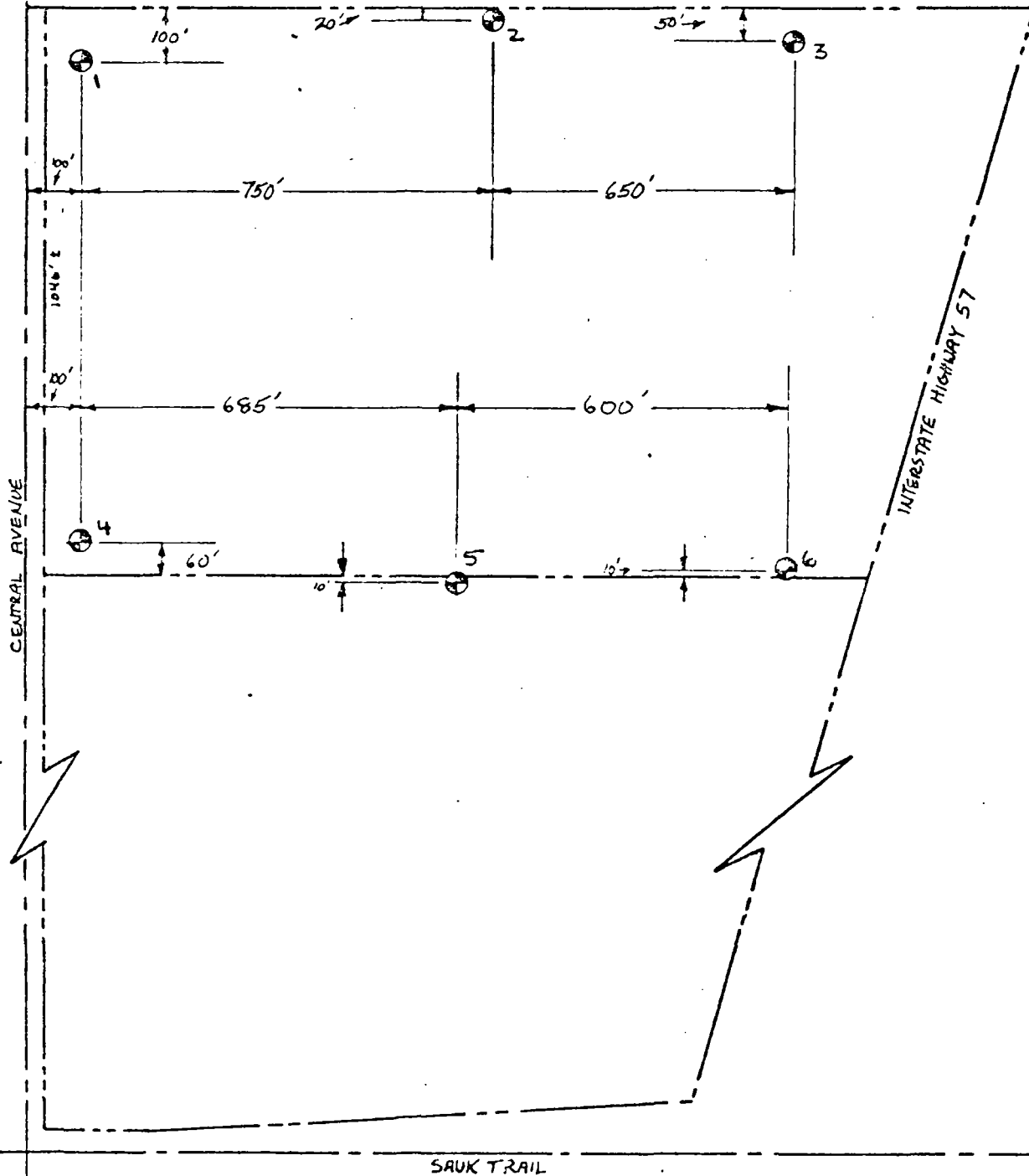
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General Conditions (Continued)H. Settlement

to consolidation under any significant increased loading. Laboratory consolidation tests provide the most reliable data on which to base estimates of magnitudes and time rates of consolidation of the soils in the field. Our consolidation analysis should provide a fairly reliable prediction of settlement assuming that the soft soils are not more compressible nor thicker than encountered at the boring locations, and provided that loads furnished or assumed are close to actual applied loads. Total consolidation settlement is usually divided into primary and secondary phases. The primary consolidation of inorganic compressible soils usually takes place over a several year period, and secondary consolidation settlement, though not as predictable, is generally negligible. For organic compressible soils, the secondary consolidation settlement could exceed the estimated primary settlement over the life of the proposed structure.

EJ & E RAILROAD RIGHT OF WAY

COMMONWEALTH EDISON COMPANY RIGHT OF WAY
CHICAGO DISTRICT PIPELINE COMPANY RIGHT OF WAY



⊗ = TEST BORING LOCATIONS



SOIL BORING LOCATIONS
PROPOSED SOLID WASTE DISPOSAL FACILITY
COOK COUNTY, ILLINOIS

WALTER H. FLOOD & CO. INC.

SCALE 1" = 300' ±

BY GF